

#36 / Appeal
Brief

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appellants: Charles Drill *et al.*

Serial No. 08/824,633

Filed: March 27, 1997

For: A Customized Polishing Pad for Selective Process
Performance During Chemical Mechanical Polishing

Patent Application

Examiner: Maurina Rachuba

Group: 3723

Docket No.: PHA 51265

APPEAL BRIEF

Assistant Commissioner for Patents & Trademarks
Washington, DC 20231

Sir:

This is an Appeal Brief submitted pursuant to 37 CFR §1.1.92 for the above-referenced patent application and is being filed in triplicate.

I. REAL PARTY IN INTEREST

The real party in interest is Koninklijke Philips Electronics NV (KPENV); a corporation organized under the laws of The Netherlands. The patent application had been assigned to VLSI Technology, Inc. (VLSI); a corporation organized under the laws of the State of Delaware and having a principal place of business in San Jose, California. VLSI had been acquired by KPENV in June of 1999 through its sister division, Philips Electronics North America Corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 22, 35 are being appealed.

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IV. STATUS OF AMENDMENTS

Appellant filed the application on March 27, 1997. In response to the first Non-Final Office Action Restriction Requirement dated November 20, 2001, Appellant filed a Response and Amendment dated October 27, 1988, canceling claims 18-19 without traverse and electing claims 1-17. In response to a second Non-Final Office Action dated February 12, 1999, Appellant filed a Response and Amendment dated June 14, 1999, amending claims.

Appellant filed a Continued Prosecution Application dated November 22, 1999 with a preliminary amendment, in response to a Final Office Action dated July 21, 1999. In response to a Final Office Action dated January 24, 2000, Appellant filed a response and amendment dated May 24, 2000.

Appellant filed a Request for Continuing Examination on August 8, 2001. Appellant filed a Response and Amendment in response to Final Office Action dated March 8, 2001. In response to Office Action dated October 5, 2001, Appellant filed a Response and Amendment dated January 4, 2002.

Appellant filed a Request for Continuing Examination on May 31, 2002. A Response and Amendment was filed in response to the Non Final Office Action dated April 22, 2002. In response to a Non-Final Office Action dated September 25, 2002, Appellant filed a Response and Amendment dated November 1, 2002. In response to a Final Office Action dated January 23, 2003, Appellant filed a Response and Amendment dated March 4, 2003.

The claims as finally amended are attached hereto as an Appendix.

V. SUMMARY OF INVENTION

The present invention relates generally to the field of chemical mechanical polishing, and more particularly to polishing pads that have two or more polishing regions with each polishing region having distinct polishing characteristics that are different from those of the other polishing region(s). These polishing regions, which have different, and distinct, polishing characteristics, are arranged such that a work piece to be polished, e.g., a wafer, can be selectively frictionally engaged with a particular one

of those regions. For example, consistent with the present invention, the polishing regions may be disposed on a circular polishing pad as concentric annular regions. In a further example, the polishing regions may be disposed as parallel linear regions on a linear pad (e.g., a belt). By arranging these regions of distinct polishing characteristics such that a wafer may be selectively polished by only one region when it is selectively placed in contact with that portion of a polishing pad, enables methods wherein the amount of time of polishing with those regions of distinct polishing characteristics may be controlled to achieve a desired polishing result. In other words, the structure of the polishing pads in accordance with the present invention permits a wafer to remain in contact with a region having a single, distinct, polishing characteristic even though the pad is in motion and travels through one or more complete rotations in the case of a circular pad, or through one or more complete loops in the case of a linear pad.

Polishing pads, configured in accordance with the present invention, may have a uniform top layer with distinct underlying regions that impart the different, distinct polishing characteristics to the polishing regions. Alternatively, such polishing pads may have a uniform under layer with a top layer having distinct regions of hardness, surface texture, or any other attribute that affects polishing characteristics.

Claims 22-35 are drawn to Appellants' invention of polishing pads suitable for chemical-mechanical polishing of wafers where those pads have two or more regions, each of those regions has a different polishing characteristic, and where the wafer may be selectively placed in frictional contact with any particular region of the polishing pad for a predetermined continuous amount of time regardless of the motion of the pad. In other words, a wafer to be polished can be placed on a region of the polishing pad having a certain polishing characteristic, and, regardless of whether the pad moves radially (e.g., as with a circular pad) or linearly (e.g., as with a belt), the wafer can remain in the region having the selected polishing characteristic until it (i.e., the wafer) is moved, typically under control of the polishing machine, to another region having a different polishing characteristic.

VI. ISSUES FOR REVIEW

Claims 22, 26, 27, and 28 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Glover* (US 959,054).

Claims 29, 30, 34, and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Glover* (US 959,054) in view of *Cote et al.* (US 5,534,106).

Claims 23-25 and 31-32, stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Glover* (US 959,054) in view of *Cote et al.* (US 5,534,106).

The issues are as follows:

1. Is the §102 rejection of the claims proper, when the asserted '054 reference is alleged to anticipate Appellant's claimed invention, even though the reference is not capable of being used in the technology covered by Appellants' invention?
2. Is the §103 rejection of the claims proper when the asserted '054 and/or '106 references fail to teach or suggest every element of the claimed invention and, therefore, the Examiner failed to establish a *prima facie* case of obviousness?

VII. GROUPING OF CLAIMS

For the purposes of this appeal, claims 22 – 28 are in Group 1; claims 29 – 35, are in group 2. The claims as now presented do not stand or fall together.

VIII. ARGUMENT

Claims 22-28 of group 1, are separately patentable over the prior art because it is directed to subject matter including, a polishing pad suitable for chemical mechanical polishing of wafers. The polishing pad has a circular base layer and an overlying circular toplayer. The overlying circular top layer forms the polishing surface of the polishing pad. The polishing surface that has at least two polishing regions thereon. At least two polishing regions are disposed on the polishing pad as concentric annular regions.

Claims 29-35 of group 2 is separately patentable over the prior art and other claim group because they are directed to subject matter including a polishing pad suitable for chemical mechanical polishing of wafers. In contrast with the group 1 claims, the

polishing pad has a linear base layer and an overlying top layer. The overlying linear top layer forms the polishing surface of the polishing pad. The polishing surface of the polishing pad has at least two polishing regions thereon. The at least two polishing regions have distinct polishing characteristics and are disposed on the polishing pad as parallel linear regions.

A. Scope and Content of the Prior Art.

Glover (US 959,054) titled, "Grinding and Polishing Disk," relates to improvements in grinding and polishing apparatus, and particular to a disk grinder as a new article of manufacture. The object of the invention is to provide a prepared disk in which the abrasive material is applied to one side face and is *graded from the center outwardly*. For grinding, the article to be ground is first applied to that part of the disk having the coarser abrasive. The operator may gradually work, without interruption, from this part of the disk to that part of the disk which bears a finer abrasive, thus expediting materially the work to be accomplished.

Cote et al. (US 5,534,106) titled, "Apparatus for Processing Semiconductor Wafers" the invention is directed to a semi-conductor wafer processing machine including a pivotable arm having a wafer carrier disposed at one end. The wafer carrier is rotatable with the rotating motion imparted to a semi-conductor wafer held thereon. The machine includes an annular rotatable pad having an upper surface and a tank disposed within the annular pad. The tank contains a fluid bath for treating the wafer. The pad and tank are disposed below the wafer carrier. The wafer may be moved vertically and laterally by an arm so as to selectively come into contact with the rotatable pad or be bathed in the fluid bath.

B. Discussion of the Issues.

ISSUE 1:

The §102 rejection of the claims is improper, when the asserted '054 reference is alleged to anticipate Appellant's claimed invention, even though the reference is not capable of being used in the technology covered by Appellants' invention.

The Appellants assert, *Glover* does not disclose the claimed limitation of each polishing region having **distinct polishing characteristics** [emphasis added]. In fact, *Glover* states at col. 1, lines 13-16, that an object of the invention is to provide a prepared disk in which the abrasive material is applied to one side face and is **graded** [emphasis added] from the center outwardly; and further states at col. 2, lines 60-65 that the grinding and polishing means comprises abrasive material applied to one surface of a disk, with the abrasive **being of different degrees of fineness varying gradually and uniformly from the center to the outer edge of the disk in all directions** [emphasis added]. In other words, *Glover* does not disclose the regions of distinct polishing characteristics recited in Appellants' claims. Therefore, those claims cannot be anticipated by *Glover*.

Per MPEP §2131:

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently describe in a single prior art reference." *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628,631,2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as contained in the . . . claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim.

Furthermore, the Examiner states in paragraph 3 of the 25-SEP-2002 Office Action, "*that a recitation of the intended use of the claimed invention ('suitable for chemical mechanical polishing of wafers') must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. . .*"

Appellant respectfully asserts the cited art has structural differences that render the disk grinder (using *Glover's* pads) incapable of performing its intended use if it were employed by Appellants' invention, namely chemical-mechanical polishing (CMP) of integrated circuits on wafer substrates. *Glover*, in 1910 would be applicable to disk

grinder polishing of items on a macroscopic level. For example, the work piece that *Glover* would apply his invention to the technology of that era most certainly would *not* include chemical mechanical polishing, such technology being nearly a century away in the distant future.

Whereas, Appellants' claimed invention is for the polishing of wafers on a microscopic level. The polishing entails the smoothing out of features whose dimensions are on the order of microns and below. If *Glover* were used in the CMP arts as the Examiner alleges, useful products from silicon substrates would be impossible to obtain. Emery is an abrasive commonly employed and the varying grades thereof from coarse to fine may be very successfully used in this connection (lines 32 – 35). The abrasives available in 1910 would be far too coarse to use. Most certainly, emery would not be used in a modern CMP process. The abrasives would wipe away any useful circuit areas printed on the substrate because the size of the abrasive would be similar to the features printed.

Consequently, *Glover's* grinding and polishing disk *would not be capable of performing the intended use* as applied to CMP.

Therefore, because the pad of *Glover* does not have distinct regions of Appellants' claimed invention and the structure of *Glover* is not suitable for CMP, Appellants' respectfully assert that the Examiner has not established a proper §102(b) rejection and must be reversed.

ISSUE 2: The §103 rejection of the claims is improper when the asserted '054 and/or '106 references fail to teach or suggest every element of the claimed invention and, therefore, the Examiner has failed to establish a *prima facie* case of obviousness.

Appellants respectfully reassert that *Glover* does not disclose or suggest Appellants' claimed invention as discussed in reference to ISSUE 1, as it relates to CMP. *Glover* does not disclose the regions of distinct polishing characteristics recited in Appellants' claims. Therefore, those claims cannot be obvious in view of *Glover*.

MPEP 2143.01 provides:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)

Appellants respectfully assert, *Cote et al.*, discloses chemical mechanical polishing of wafers using a polishing pad that has two or more regions of different polishing characteristics. The regions of the pads shown and described by *Cote et al.*, are arranged as wedges, or alternatively as half circles, such that a wafer is exposed to each of the regions during each rotation of the pad. See, for example, column 6, lines 54-59, where it is stated: "Since both pad 202 and wafer are rotating, the wafer undergoes alternating abrasion and polishing. This cycle is continuously repeated with each rotation of pad 202, to provide continuous application of alternating abrasion and polishing to the wafer." The invention defined by Appellants' Claims require that the regions of different polishing characteristics be disposed either as concentric annular regions for circular pads, or as parallel linear regions for polishing pads that are configured as linear belts. This is in contradistinction to *Cote et al.*, which teaches pad configurations designed to continuously expose the wafer to the different polishing regions with each rotation of the polishing pad (which is equivalent to each loop of a linear or belt-style pad). *Cote et al.*, teaches away from Appellants' invention.

Since the combination of *Glover* with *Cote et al.*, alone or in combination fails to teach or suggest the regions of distinct polishing characteristics of Appellants' claimed invention, and in fact teaches away from Appellants' claimed invention, the rejections under 35 USC 103(a) should be withdrawn. Such withdrawal is consistent with MPEP 2143.01.

Appellants' respectfully assert that the Examiner has not established a proper §103 rejection and must be reversed.

IX. CONCLUSION

Appellant respectfully request reversal of the rejections as applied to the appealed claims and allowance of the application.

Please charge Deposit Account No. 14-1270 (PHA 51265) in the amount of \$320.00 for filing of a Brief in support of an appeal as set forth in 37 CFR §1.17(c).

Respectfully submitted,

Date: 18-JUN-2003

By Peter Zawilski
Peter Zawilski
Registration No. 43,305
(408) 474-9063

Correspondence Address:

Corporate Patent Counsel
Philips Electronics North America Corporation
1000 West Maude Avenue
Sunnyvale, CA 94085



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PATENT TRADEMARK OFFICE

APPENDIX OF CLAIMS - 08/824,633

22. A polishing pad suitable for chemical mechanical polishing of wafers, comprising:
a circular base layer and an overlying circular top layer, the overlying circular top layer forming the polishing surface of the polishing pad;
wherein the polishing surface of the polishing pad has at least two polishing regions thereon, the at least two polishing regions having distinct polishing characteristics, and wherein the at least two polishing regions are disposed on the polishing pad as concentric annular regions.
23. The polishing pad of Claim 22, wherein the circular base layer comprises at least two concentric annular regions, each of the at least two base layer concentric annular regions disposed so as to underlie a corresponding one of the at least two polishing regions.
24. The polishing pad of Claim 23, wherein each of the at least two base layer concentric annular regions has a hardness that is different from the others of the at least two base layer concentric annular regions.
25. The polishing pad of Claim 23, wherein each of the at least two base layer concentric annular regions has a thickness that is different from the others of the at least two base layer concentric annular regions.
26. The polishing pad of Claim 22, wherein the circular top layer comprises at least two concentric annular regions, each of the at least two top layer concentric annular regions disposed so as to correspond with a single one of the at least two polishing regions; and each of the at least two top layer concentric annular regions having different polishing characteristics.
27. The polishing pad of Claim 22, wherein the circular top layer comprises at least two concentric annular regions, each of the at least two top layer concentric annular regions disposed so as to correspond with a single one of the at least two polishing regions; and

each of the at least two top layer concentric annular regions having different surface textures.

28. The polishing pad of Claim 22, wherein the at least two polishing regions are each of a size such that the wafer can be frictionally engaged with one of the at least two concentric annular polishing regions without simultaneously being engaged with others of the at least two concentric annular polishing regions.

29. A polishing pad suitable for chemical mechanical polishing of wafers, comprising:
a linear base layer and an overlying linear top layer, the overlying linear top layer forming the polishing surface of the polishing pad;

wherein the polishing surface of the polishing pad has at least two polishing regions thereon, the at least two polishing regions having distinct polishing characteristics, and wherein the at least two polishing regions are disposed on the polishing pad as parallel linear regions.

30. The polishing pad of Claim 29, wherein the at least two polishing regions are each of a size such that the wafer can be frictionally engaged with one of the at least two parallel linear polishing regions without simultaneously being engaged with others of the at least two parallel linear polishing regions.

31. The polishing pad of Claim 29, wherein the linear base layer comprises at least two parallel linear regions, each of the at least two base layer parallel linear regions disposed so as to underlie a corresponding one of the at least two polishing regions.

32. The polishing pad of Claim 31, wherein each of the at least two base layer parallel linear regions has a hardness that is different from the others of the at least two base layer parallel linear regions.

33. The polishing pad of Claim 31, wherein each of the at least two base layer parallel linear regions has a thickness that is different from the others of the at least two base layer parallel linear regions.

34. The polishing pad of Claim 29, wherein the linear top layer comprises at least two parallel linear regions, each of the at least two top layer parallel linear regions disposed so as to correspond with a single one of the at least two polishing regions; and each of the at least two top layer parallel linear regions having different polishing characteristics.

35. The polishing pad of Claim 29, wherein the linear top layer comprises at least two parallel linear regions, each of the at least two top layer parallel linear regions disposed so as to correspond with a single one of the at least two polishing regions; and each of the at least two top layer parallel linear regions having different surface textures.